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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/519,537

Applicant(s)

KOOOPS ET AL.

Examiner

ALTREV C. SYKES

Art Unit

1786

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 July 2010.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5, 7 and 9-36 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-5, 7 and 10-36 is/are rejected.
7) ☒ Claim(s) 9 is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/GS/US)
4) ☐ Interview Summary (PTO-413)
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____
Paper No(s)/Mail Date _____

DETAILED ACTION

Response to Amendment

1. Examiner acknowledges the amendment to the claims filed July 21, 2010. Claims 1-5, 7 and 9-36 are pending in the application.

Response to Arguments

2. Applicant's arguments filed July 21, 2010 with respect to Howard et al. have been fully considered but they are not persuasive.

Applicant argues the presently claimed process is distinguishable from Howard et al. by providing a simplified process in which porosity is achieved in a single extrusion step. There is no need for a subsequent extraction or stretching step any more (see page 4, lines 1-2 of the present specification). Applicants wish to point out that though the phase inversion according to the presently claimed invention proceeds in two different stages; the actual processing conditions applied by man involve one single step, i.e., extrusion of a fiber stream into a coagulation bath. On the other hand, Howard et al. requires an additional man-driven extraction step following the extrusion step, to obtain fibers with the desired porosity. For at least this reason, the presently claimed method is different from that described in Howard et al. Moreover, the presently claimed method is a significant improvement.

Examiner is not persuaded. Applicant describes the instantly claimed method as a single step extrusion in the filed remarks. However, examiner notes that the process as claimed requires two steps. Additionally, the instant specification describes the process in two steps using the phrases "in the first step" and "as the second step". (See pg. 11, lines 6-9) Therefore, examiner maintains the position as set forth in the last mailed rejection and below. Further, examiner notes that Howard et al. discloses a single extrusion step. (See Col 1, lines 63-68) With respect to the subsequent extraction step, examiner notes that the coagulation bath taught by Howard et al. is recited in the instant claim as step (ii) of the claimed process.

Applicant argues the Office Action appears to assert that Howard et al. discloses providing porosity *during* extraction, relying on the description at col. 5, lines 38-60 of Howard et al. (page 5, lines 1-8 from the bottom). Applicants wish to point out that Howard et al. discloses in the cited passages, directing a hot gas stream against the extrudate at an angle designed to *attenuate* the filaments or fibers being extruded. Attenuation has, however, little to do with porosity. This is for instance

Examiner notes that it appears that applicant is trying to argue the step in which porosity is achieved in the process. If this is the case, examiner notes that such argued limitations do not appear in the instant claims. Therefore, the fact remains that Howard et al.

discloses a two step process which achieves a porous fiber containing particulate material.

Applicant argues that an embodiment involving directing a hot gas stream *at an angle* as described in Howard et al. does not constitute parallel coextrusion. Howard et al. refers in Examples 1 and 7 to the die according to U.S. Patent No. 3,947,537. It is submitted that Figures 1 and 2 in combination with the description at col. 2, lines 32-35 and 50-52 of US '537 show that parallel coextrusion of a stream next to the nascent fiber is not achieved. Howard et al. and US '537 focus on attenuating the extrudate at the die opening. Applicant argues even if a skilled person might modify the angle with which the gas stream is directed upon the extrudate upon leaving the orifice in Howard et al., he would not be motivated to change the setup to a parallel gas or liquid stream as presently claimed, for he would no longer achieve the attenuation desired in Howard et al. Applicants also wish to point out that although mathematically correct, "parallel flow" is not merely "tailoring the angle in Howard et al. It is once again noted that the motivation for a skilled person to attempt to control porosity has to come from the present application, a hindsight approach which is impermissible.

Examiner is not persuaded. The instant claims recite the phrase "along an exterior medium of the nascent fiber". Howard et al. is explicit to directing a hot gas stream against the extrudate. (See Col 5, lines 45-50) While that section of the reference does

use the phrase "at an angle", examiner notes that 0° is indeed an angle. Moreover, examiner notes that the word "along" is not deemed synonymous with the term "parallel". Also, the instant specification does not seem to describe the controlled flow using the term "parallel". Further, examiner notes that in Figure 2 of US Patent No. 3,947,537, the gas stream is being supplied through gas jets 11 and 12. As such, one of ordinary skill in the art would appreciate that while the jets are placed at an angle to the die openings 6, the flow of the gas stream would follow an inherently parallel direction along the fiber as it is extruded. Finally, examiner notes that the die devices referenced in U.S. Patent No. 3,947,537 are only examples of those known in the art at the time of the Howard et al. invention. In no way is Howard et al. limited to a particular extrusion device as clearly set forth in the reference. (See Col 7, lines 4-7) Therefore, the motivation for modifying the angle of the gas stream comes from the fact that Howard et al teaches any conventional extrusion device known to be suitable in the art of filament and fiber formation may be used and not from hindsight as argued. (See Col 5, lines 25-30)

Applicant argues the EPA Technical Bulletin does not rectify the above noted deficiencies of Howard et al., the combination of Howard et al. and the EPA Technical Bulletin still would not result in the subject matter of claim 1, from which claims 17 and 22 depend indirectly and directly. Accordingly, the Examiner is respectfully requested to reconsider and withdraw the rejection.

Examiner is not persuaded and maintains the position as set forth above and again below.

It is noted that this argument is repeated for prior art Koops, Arnold, Pretorius, Koenhen, Hensley, and Boggs. These rejections are maintained.

Finally, applicant argues Howard et al. discloses a process involving two separate steps, an extrusion step and a subsequent extraction step. On the other hand, claim 36 specifically recites that there is no additional step after (ii) (the extrusion step). For this reason additionally, claim 36 is patentable over Howard et al.

Examiner is not persuaded. Examiner notes that step (ii) as recited by applicant involves the fiber entering into a coagulation bath. As such, it is noted that Howard et al. does not disclose a subsequent *fiber forming* step after the coagulation bath. It is noted however, that both applicant and Howard et al. disclose a post heat treatment (i.e. drying step). (See instant specification pg. 12, lines 25-30 and Col 6, lines 53-59)

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 1-5, 7 and 9-36 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. In this case, claim 1 has been amended to recite "a liquid, a vapor or a gas mixture comprising a solvent and a non-solvent for said polymeric material". Examiner notes that while there is support for a liquid mixture at pg. 11, lines 26-27 of the instant specification, there appears to be no disclosure for a vapor mixture or a gas mixture comprising a solvent and a non-solvent. Further, the instant specification recites it is possible to apply a gas stream comprising a nonsolvent for the polymer wherein the nonsolvent is water vapor. (See pg. 11, lines 28-29) As such, examiner notes that in the very least the gas stream would comprise two non-solvents and no solvent. Therefore, the amended claims do not meet the written description requirement.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:
 1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
7. Claims 1-5, 7, 10-16, 18, and 25-36 rejected under 35 U.S.C. 103(a) as being unpatentable over Howard et al. (US 5, 093,197) as set forth above, in view of Koops et al. (WO 93/12868).

Regarding claims 1, 2, 3, 12, 13 and 29 Howard et al. discloses fibers and filaments are formed by the process of preparing a mixture of an ultra-high-molecular-weight polyolefin, filler and plasticizer, conveying the extrudate to a fiber or filament forming type die, expressing the extrudate through the die openings to form fibers or filaments, and extracting at least a portion of the extractable plasticizer to provide the desired porosity. (See Abstract) Examiner therefore equates the polyolefin as disclosed by Howard et al. to the polymeric support matrix as claimed by applicant. Howard et al. discloses the filler may comprise particles. (See Col 3, lines 26-29) Examiner therefore equates the filler as disclosed by Howard et al. to the particulate material as claimed by applicant.

Howard et al. discloses preferred plasticizers are those extractable organic substances that have a solubility parameter close to that of the polyolefin. (See Col 3, lines 58-67 and Col 4, lines 1-3) Howard et al. discloses the plasticizer may be a liquid. (See Col 5, lines 3-4) Therefore, examiner equates the plasticizer as disclosed by Howard et al. to the solvent as claimed by applicant. Howard et al. discloses the extrusion mixture is metered to any conventional extrusion device such as that having the design disclosed in U.S. Patent No. 3,947,537. (See Col 5, lines 25-28) Howard et al. discloses the output of the extrusion device is fed to a die suitable for forming filaments or fibers, such as a spinneret type die. (See Col 5, lines 39-41) Such dies are well known in the art, and may include manifolds on one or both sides of the die orifices for directing a hot gas stream against the extrudate at an angle designed to attenuate the filaments or fibers being extruded. (See Col 5, lines 45-49) Examiner notes that in Figure 2 of U.S. Patent No. 3,947,537, the gas stream is being supplied through gas jets 11 and 12. As such, one of ordinary skill in the art would appreciate that while the jets are placed at an angle to the die openings 6, the flow of the gas stream would follow an inherently direction along the fiber as it is extruded. Therefore examiner equates the hot gas stream as disclosed by Howard et al. to the process of applicant resulting in a first phase separation of the exterior of the nascent fiber.

Howard et al. discloses the extraction of the plasticizer may be carried out on a batch basis or on a continuous basis by passing the filaments or fibers, through a liquid and/or vapor bath of the extraction media, generally in a countercurrent extraction manner. (See

Col 6, lines 45-50) Therefore, examiner equates the bath process as disclosed by Howard et al. to the second phase separation and arrest of the structure as claimed by applicant. Finally, Howard et al. discloses the process forms solid fibers or filaments. (See Col 8, lines 65-67) Howard et al. further discloses the amount of filler in the filaments and fibers is preferably greater than the amount of polymer. (See Col 2, lines 56-64) Howard et al. discloses blend is introduced into the extruder which comprises from about 5 to about 65 percent by volume of the ultrahigh molecular weight polyolefin component, about 5 to about 60 volume percent of the filler component and about 20 to about 80 percent by volume of the plasticizer component. (See Col 4, lines 61-68) Therefore, examiner notes that Howard et al. discloses polymer and filler component ranges which overlap the ranges claimed by applicant. However, Howard et al. is silent as to an extrusion mixture which does not contain a plasticizer component. The reference does not specifically disclose the solvents as claimed by applicant and in the claimed amount. Howard et al. is also silent as to specific additives.

Koops et al. discloses a method for the production of hollow fiber membranes with the aid of a one-step process using a spinning head which has three concentrically arranged outlet openings. (See Abstract) Examiner notes that a spinning head having three concentrically arranged outlet openings would be equivalent to a triple layer spinneret as claimed by applicant. Koops et al. discloses the membranes can be tailored for gas separation, pervaporation, as well as for ultrafiltration and microfiltration. (See pg. 2, lines 13-16 and pg. 8, lines 13-21) Koops et al. discloses the spinning process is in

principle suitable for all polymers or mixtures of polymers which are readily soluble in organic solvents such as N-methylpyrrolidone, dimethylformamide and dimethylacetamide. (See pg. 3, lines 30-36) Koops et al. discloses polymers such as polysulphone and polyether sulphone are preferred polymers. (See pg. 15 Examples III and IV) Koops et al. discloses the concentration of the polymer solution can vary from about 15-40% by weight of polymer and the polymer solution can also be provided with extra additives in order to obtain a desired porosity and to influence "macrovoid" formation. (See Col 4, lines 5-13) Koops et al. discloses instead of an inert gas it is possible to feed a vapour through the outermost opening of the spinning head. If a vapour of a non-solvent which instantaneously demixes with the polymer solution is used, a porous top layer will be obtained as a result of phase inversion by the vapour. (See pg. 11, lines 25-30) Koops et al. discloses a mixture of vapours of a solvent and a non-solvent can be used to influence the formation of the membrane. (See pg. 11, lines 33-35) Therefore, examiner notes that in the three layer spinneret of Koops, the outermost opening comprises a mixture of a solvent and a nonsolvent would be equivalent to the exterior medium as claimed by applicant.

As Howard et al. and Koops et al. are both directed to hollow fiber membranes, the art is analogous. Therefore, it would have been obvious to one of ordinary skill in the art to use the one-step process using a spinning head which has three concentrically arranged outlet openings as taught by Koops et al. for producing the hollow fiber membranes as disclosed by Howard et al. since teaches any known conventional extrusion device may

be used to produce the fibers for the membrane. While Koops et al. is not explicit to a filler material as taught in Howard et al., one of ordinary skill in the art would have been motivated to utilize an extrusion mixture as claimed by applicant motivated by the desire to obtain a desired porosity and to influence "macrovoid" formation. (See Koops Col 4, lines 5-13 and Howard Col 3, lines 25-30) Further, one of ordinary skill in the art would have been motivated to combine the teachings of Howard et al. and Koops et al. in order to tailor the hollow fiber membranes for gas separation, pervaporation, as well as for ultrafiltration and microfiltration. (See Koops pg. 2, lines 13-16 and pg. 8, lines 13-21)

Regarding claims 4 and 5, Howard et al. discloses a blend is introduced into the extruder which comprises from about 5 to about 65 percent by volume of the ultrahigh molecular weight polyolefin component, about 5 to about 60 volume percent of the filler component and about 20 to about 80 percent by volume of the plasticizer component. (See Col 4, lines 61-68) Howard et al. discloses suitable water soluble plasticizers include glycerol, polyethylene glycol and polyvinyl pyrrolidone. (See Col 4, lines 12-17) Howard et al. discloses other, conventional, additives may be added to the extrusion mixture, such as antioxidants, colorants and lubricants. (See Col 4, lines 29-31) Therefore, examiner notes that the plasticizer as taught by Howard in the extruded mixture would be equivalent to an additive as claimed by applicant. Koops et al. also teaches the claimed limitations. (See pg. 4, lines 5-13)

Regarding claims 7 and 27, Howard et al. discloses blend is introduced into the extruder which comprises from about 5 to about 60 volume percent of the filler component. (See Col 4, lines 61-68) Howard et al. discloses varying the amount of filler where resistance to rapid wettability of the web formed from the fibers and filaments is desired. (See Col 4, lines 43-51) Therefore, Howard et al. anticipates the claimed range of applicant for particulate material.

Regarding claims 10 and 25, Howard et al. discloses the use of a die which may include manifolds on one or both sides of the die orifices for directing a hot gas stream against the extrudate at an angle designed to attenuate the filaments or fibers being extruded. (See Col 5, lines 45-49) As such, the angle of Howard could be easily tailored to meet the limitations of applicant. Additionally, the hot gas stream would readily comprise a nonsolvent for the polymer (i.e. air).

Regarding claim 11, Koops et al. discloses the nonsolvent may be water. (See Col 5, lines 13-16)

Regarding claims 14, 26, and 28 Howard et al. discloses the preferred filler materials are those that have surface silanol groups, i.e., siliceous fillers, which can hydrogen bond to water, such as silica, mica, montmorillonite, asbestos, talc, diatomaceous earth, vermiculite, synthetic and natural zeolites, portland cement, silicates and polysilicates, alumina silica gels, and glass particles. The preferred siliceous filler is silica, and

precipitated silica is the preferred type of silica. (See Col 3, lines 18-25) Howard et al. discloses the filler should, desirably, have a high surface area, which means it has either a small particle size or a high degree of porosity (i.e., high surface area or pore volume), or both. (See Col 3, lines 26-29) Therefore, examiner notes that one of ordinary skill in the art at the time of the invention would have readily expected the particulate material to be altered in its function since Howard et al. discloses that it is preferred that the filler be able to hydrogen bond to water by providing surface silanol groups.

Regarding claim 15, examiner notes that zeolite is adsorptive material as evidenced by its known frequent use in filter materials. (See also Col 3, lines 12-15)

Regarding claim 16, examiner notes that a zeolite is also called an ion exchange resin, particularly when used as a water softener as would be readily known by one of ordinary skill in the art.

Regarding the limitation of claim 18 it should be noted that the recitation of “the particulate material is used for size exclusion” are considered to be intended use statements and are not given patentable weight at this time since the prior art meets the structural and/or chemical limitations set forth and there is nothing on record to evidence that the prior art product could not function in the desired capacity or that there is some additional implied structure associated with the term. Howard et al. discloses the filler is used to provide enhanced microporosity to the filaments and fibers. (See Col 2, lines 46-

48) Further, Howard et al. discloses the fibers and filaments, as well as the fabrics and webs made therefrom, also make excellent filter media and can also be used as the substrate for timed release of pharmaceuticals, agricultural and other chemicals. (See Col 9, lines 3-7)

Regarding claims 30 and 31, Howard et al. discloses a particularly good use for the woven and nonwoven webs made from the filaments and fibers are as battery separators. (See Col 9, lines 8-10) Howard et al. discloses the separators may be substituted for glass fiber type separators currently used in both flooded cell and starved electrolyte batteries. (See Col 9, lines 44-46) Examiner therefore equates the batteries comprising fibers as disclosed by Howard et al. to a module (i.e. housing and body) comprising fiber as claimed by applicant.

Regarding claims 32-35, it should be noted that the recitation of "a method for the adsorption and/or purification of compounds from a mixture, a method for the immobilization of a catalyst in a reaction mixture, a method for the immobilization for a chemical or biological compound, and a method wherein the mixture of compounds is a fermentation broth, a tissue brother, a plant broth, or a cell broth" are anticipated by the prior art. Howard et al. discloses the fibers and filaments, as well as the fabrics and webs made therefrom, make excellent filter media and can also be used as the substrate for timed release of pharmaceuticals, agricultural and other chemicals. (See Col 9, lines 3-7) The prior art meets the structural and/or chemical limitations set forth and there is

nothing on record to evidence that the prior art product could not function in the desired capacity or that there is some additional implied structure associated with the terms.

Regarding claim 36, examiner notes that step (ii) as recited by applicant involves the fiber entering into a coagulation bath. As such, it is noted that Howard et al. does not disclose a subsequent *fiber forming* step after the coagulation bath. It is noted however, that both applicant and Howard et al. disclose a post heat treatment (i.e. drying step). (See instant specification pg. 12, lines 25-30 and Col 6, lines 53-59)

8. Claims 17 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Howard et al. (US 5, 093,197) in view of the EPA Technical Bulletin on Zeolite.

Regarding claims 17 and 22, Howard et al. discloses the fibers are hydrophobic at lower filler loadings. (See Col 7, lines 66-68) Howard et al. discloses that in addition to natural zeolite, synthetic zeolite is also a preferred filler material. (See Col 3, lines 18-25) Howard et al. is not explicit to the adsorptive material being hydrophobic in nature.

The United States Environmental Protection Agency published that zeolite is synthesized to allow scientists to predict the properties of the zeolite and to make hydrophobic zeolite. (See pg. 9, EPA Technical Bulletin) The United States Environmental Protection Agency published that zeolite can be a solid acid catalyst. (See pg. 11, EPA Technical

Bulletin) The EPA also teaches that zeolite can remove ammonia from wastewater and urine. (See pg 5 EPA Bulletin)

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to synthesize zeolite in order to provide for a filler material having specific properties, such as an adsorptive particulate material which is hydrophobic in nature, motivated by the desire to tailor the filler material in the fibers for specific use in filter media applications. (See Col 9, lines 3-7) Additionally, one of ordinary skill in the art of filter media would have been easily motivated to functionalize the particulate material as taught by Howard with a catalyst in order to tailor the filler for particular substance removal properties in the final filter media membrane. (See pg. 9, EPA Technical Bulletin)

9. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Howard et al. (US 5, 093,197) in view of Arnold et al. (US 5,786,428).

Regarding the limitation of claim 20 Howard et al. discloses the filler material may be carbonaceous material, metal oxides and hydroxides, metal carbonates, minerals, synthetic and natural zeolites, portland cement, precipitated metal silicates, alumina silica gels, glass particles, and salts. (See Col 3, lines 4-17) Howard et al. discloses the preferred filler materials are those that have surface silanol groups and include siliceous filler such as silica and participated silica. (See Col 3, lines 18-25) Howard et al.

discloses the fibers and filaments, as well as the fabrics and webs made therefrom, also make excellent filter media and can also be used as the substrate for timed release of pharmaceuticals, agricultural and other chemicals. (See Col 9, lines 3-7)

However, Howard et al. does not specifically disclose the particulate material is used for separation of optically active compounds.

Arnold et al. discloses separation systems are disclosed which use the adsorbent as the basis for conducting enantioresolution of optically active amino acids and peptides and methods for using the adsorbent. (See Abstract) Arnold et al. discloses molecularly imprinted materials are presented which are well-suited for purification and enantiomeric resolution of amino acids and peptides. (See Col 2, lines 60-63) Arnold et al. discloses the imprinted polymer matrix is also presented as a surface coating on support particles for use in separation procedures. Monodisperse, spherical silica particles are well-suited for use as the support. The silica particles are derivatized using appropriate silanizing agents. (See Col 3, lines 33-40) Arnold et al. discloses an exemplary system for conducting enantiomeric resolution of optically active amino acids and peptides includes a separation vessel 10 which is a ligand exchange column where the separation zone 12 is packed with silica particles which have been coated with adsorbent that selectively binds the d optical isomer of an amino acid such as phenylalanine. (See Col 8, lines 8-10 and 14-19)

As Howard et al. and Arnold et al. are both directed to separation membranes, the art is analogous. It has been well settled that the substitution of one material for another (i.e. one silica particle for another) is prima facie obvious when both materials are taught in the art to obtain the same desired results. As such, examiner notes that while Howard et al. is not explicit to the *use* of the silica particulate material to separate optically active compounds, it would have been obvious to one of ordinary skill in the art at the time of the invention motivated by expected success to utilize the silica particles which have been coated with adsorbent as taught by Arnold et al. in said manner since both references teach surface coated particles.

It should be noted that the recitation of “for separation of optically active compounds” is considered to be an intended use statement and is not given patentable weight at this time since the prior art meets the structural and/or chemical limitations set forth and there is nothing on record to evidence that the prior art product could not function in the desired capacity or that there is some additional implied structure associated with the term. The burden is shifted upon the Applicant to evidence the contrary.

10. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Howard et al. (US 5, 093,197) in view of Pretorius et al. (US 3,493,497).

Regarding the limitation of claim 21 Howard et al. discloses the filler material may be carbonaceous material, metal oxides and hydroxides, metal carbonates, minerals,

synthetic and natural zeolites, portland cement, precipitated metal silicates, alumina silica gels, glass particles, and salts. (See Col 3, lines 4-17) Howard et al. discloses the preferred filler materials are those that have surface silanol groups and include siliceous filler such as silica and particulated silica. (See Col 3, lines 18-25) Howard et al. discloses the fibers and filaments, as well as the fabrics and webs made therefrom, also make excellent filter media and can also be used as the substrate for timed release of pharmaceuticals, agricultural and other chemicals. (See Col 9, lines 3-7) However, Howard et al. does not specifically disclose the particulate material is used for reversed phase chromatography.

Pretorius et al. discloses a chromatographic separating process which can be adapted to produce very rapid separations in a given system. (See Col 1, lines 67-70) Pretorius et al. discloses the process may be applied to the separation or concentration of substantially all substances inherently capable of chromatographic separation or concentration and is adaptable to virtually any known type of chromatography e.g. liquid-liquid partition chromatography (including reversed phase), and liquid-solid chromatography (where the solid phase may be an adsorbent). (See Col 3, lines 52-60) Pretorius et al. discloses to improve separations and separating capacity whole pipelines adapted for the process may also be packed with a stationary phase or a support carrying a stationary phase. (See Col 7, lines 5-10) Pretorius et al. discloses the packing material should preferably be composed of rounded, e.g. approximately spherical, particles. (See Col 8, lines 5-10) The particles may for example be composed of silica gel, alumina, magnesium silicate,

various metals, glass, activated carbon, and various organic or inorganic solid adsorbents.
(See Col 8, lines 15-21)

Therefore, while Howard et al. is not explicit to the use of the silica gel particulate material in the fibers for reversed phase chromatography, one of ordinary skill in the art at the time of the invention would have readily appreciated the known use of precipitated metal silicates, alumina silica gels, and glass particles as packing material in columns for reversed phase chromatography as taught by Pretorius et al..

11. Claims 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Howard et al. (US 5, 093,197) as set forth above in view of Koenhen. (US 6,454,943).

Regarding claim 24, Howard et al. also discloses the extrusion mixture is metered to any conventional extrusion device known to be suitable in the art of filament and fiber formation. There are a number of manufacturers supplying such devices which come in various sizes dependent upon the throughput of material desired. (See Col 5, lines 25-31) While Howard et al. discloses all of the claim limitations as set forth above, the reference is not explicit to a thread, wire, yarn or the like of any material is co-extruded with the fibre.

Koenhen discloses a self-supporting capillary membrane, which is longitudinally reinforced with one or more continuous reinforcing fibres incorporated in the wall

material of the capillary membrane, which fibres extend in the longitudinal direction of the capillary membrane, said membrane being obtained by extruding the hollow fibre in a known manner using an extruder and guiding the reinforcing fibres through the spinneret of the extruder so that the reinforcing fibres are coextruded with the membrane in the longitudinal direction and are incorporated in the wall of the capillary membrane. (See Col 3, lines 25-36 and 45-63) Koenhen also discloses use of the membrane in the filtration of suspended solids and particles, and separation of solutes and liquids, of liquids and of liquids and gases. (See Col 3, lines 64-67)

As Howard et al. and Koenhen are both directed to filtration media, the art is analogous. Therefore, it would have been obvious to one of ordinary skill in the art motivated by expected success to co-extrude reinforcing fibers as taught by Koenhen with the fibers of Howard et al. since doing so would provide the completely expected result of mechanical enforcement. Additionally, one of ordinary skill in the art would have been easily motivated to use the coextrusion process as taught by Koenhen in place of the extrusion process as taught by Howard et al. since Howard et al. clearly discloses that the throughput material desired would control the parameters of the extrusion process. (See Col 5, lines 25-31)

Regarding the limitation of claim 24 it should be noted that the recitation of “for mechanical enforcement” is considered to be intended use statements and are not given patentable weight at this time since the prior art meets the structural and/or chemical

limitations set forth and there is nothing on record to evidence that the prior art product could not function in the desired capacity or that there is some additional implied structure associated with the term. The burden is shifted upon the Applicant to evidence the contrary.

12. Claims 19 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Howard et al. (US 5,093,197) in view of Hensley et al. (US 3,344,177)

Regarding claims 19 and 23, Howard et al. discloses the filler material may be carbonaceous material, metal oxides and hydroxides, metal carbonates, minerals, synthetic and natural zeolites, portland cement, precipitated metal silicates, alumina silica gels, glass particles, and salts. (See Col 3, lines 4-17) Howard et al. discloses the preferred filler materials are those that have surface silanol groups and include siliceous filler such as silica and participated silica. (See Col 3, lines 18-25) Howard et al. discloses the fibers and filaments, as well as the fabrics and webs made therefrom, also make excellent filter media and can also be used as the substrate for timed release of pharmaceuticals, agricultural and other chemicals. (See Col 9, lines 3-7) The reference does not specifically disclose the particulate material in the fibers is used for separation of isomeric compounds.

Hensley et al. discloses a purification method to obtain a substantially pure water-insoluble aromatic dicarboxylic acid product from lower purity crude products. (See Col

1, lines 10-18) Hensley et al. discloses recrystallization, washing, separation of one isomeric form from another or recovery from the oxidation reaction medium alone or in combination will produce a crude aromatic dicarboxylic acid in commercial processes. (See Col 2, lines 13-16) Hensley et al. discloses one process readily adaptable to commercial industrial operation produces an aromatic polycarboxylic acid of at least 99.9% purity or above by passing a non-alkaline aqueous solution of an alkaline salt of the aromatic dicarboxylic acid through a bed of activated carbon or charcoal. (See Col 2, lines 36-40)

It has been well settled that the substitution of one material for another (i.e. replacing zeolites for activated carbon) is prima facie obvious when both materials are taught in the art to be used in the same manner (i.e. filtration membranes). Therefore, while Howard et al. is not explicit to the use of the particulate material in the fibers to separate isomeric compounds, it would have been obvious to one of ordinary skill in the art at the time of the invention motivated by expected success to utilize activated carbon to separate isomeric compounds since Hensley et al. exemplifies this concept.

13. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Howard et al. (US 5, 093,197) as applied to claim 1 above and in view of Boggs et al. (WO 00/02638)

This rejection is over WO 00/02638 because the reference qualifies as prior art under 102(b). However, for convenience, the column and line numbers of the English language equivalent and national stage entry, US 6,899,834, will be cited below.

Regarding claims 23, Howard et al. discloses all of the claim limitations as set forth above, but the reference does not disclose the particulate material is active carbon.

Boggs et al. discloses membranes for removing organic compounds that have been added to a biological fluid which include a polymeric matrix and a particulate material immobilized within the matrix. (See Abstract) Boggs et al. discloses the composite membrane includes selectively permeable skin on the outer surface of the membrane. (See Col 3, lines 44-46) Boggs et al. discloses the membranes may also be in the form of other configurations such as fibers. (See Col 6, lines 1-2) Boggs et al. discloses the skin may include randomly spaced surface pores. (See Col 6, lines 33-34) Boggs et al. further discloses where the membrane is used to absorb selected organic compounds from a biological fluid, the particulate material may be a sorbent. Of course, selection of the sorbent may also depend, in part, on the affinity of the compound to be removed for the particular sorbent. Activated charcoal is a known and preferred sorbent. (See Col 7, lines 5-7 and 15-16)

As Howard et al. and Boggs et al. are both directed to methods for making polymeric membranes comprising particulate material, the art is analogous. Therefore, it would

have been obvious to one of ordinary skill in the art at the time of the invention to utilize the activated charcoal as the particulate material in the fibers as disclosed by Howard et al. motivated by expected success to provide membranes for commercial purifications such as for biological fluid. (See Col 1, lines 5-15) The substitution of one adsorbent material (i.e. zeolite) for another (i.e. activated charcoal) would have been completely within the ordinary skill of one in the art at the time of the invention.

14. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Allowable Subject Matter

15. Claim 9 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.
16. The following is a statement of reasons for the indication of allowable subject matter:
Claim 9 recites that the exterior medium is a liquid mixture of solvent and nonsolvent for

the polymer. The limitation for a controlled flow of a liquid mixture of solvent and non-solvent for said polymeric material along an exterior medium of the nascent fiber (as recited in combination with claim 1) is not disclosed or taught by the prior art.

Conclusion

17. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALTREV C. SYKES whose telephone number is (571)270-3162. The examiner can normally be reached on Monday-Thursday, 8AM-5PM EST, alt Friday.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Larry Tarazano can be reached on 571-272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. Lawrence Tarazano/
Supervisory Patent Examiner, Art Unit 1786

/ACS/
Examiner
8/12/10